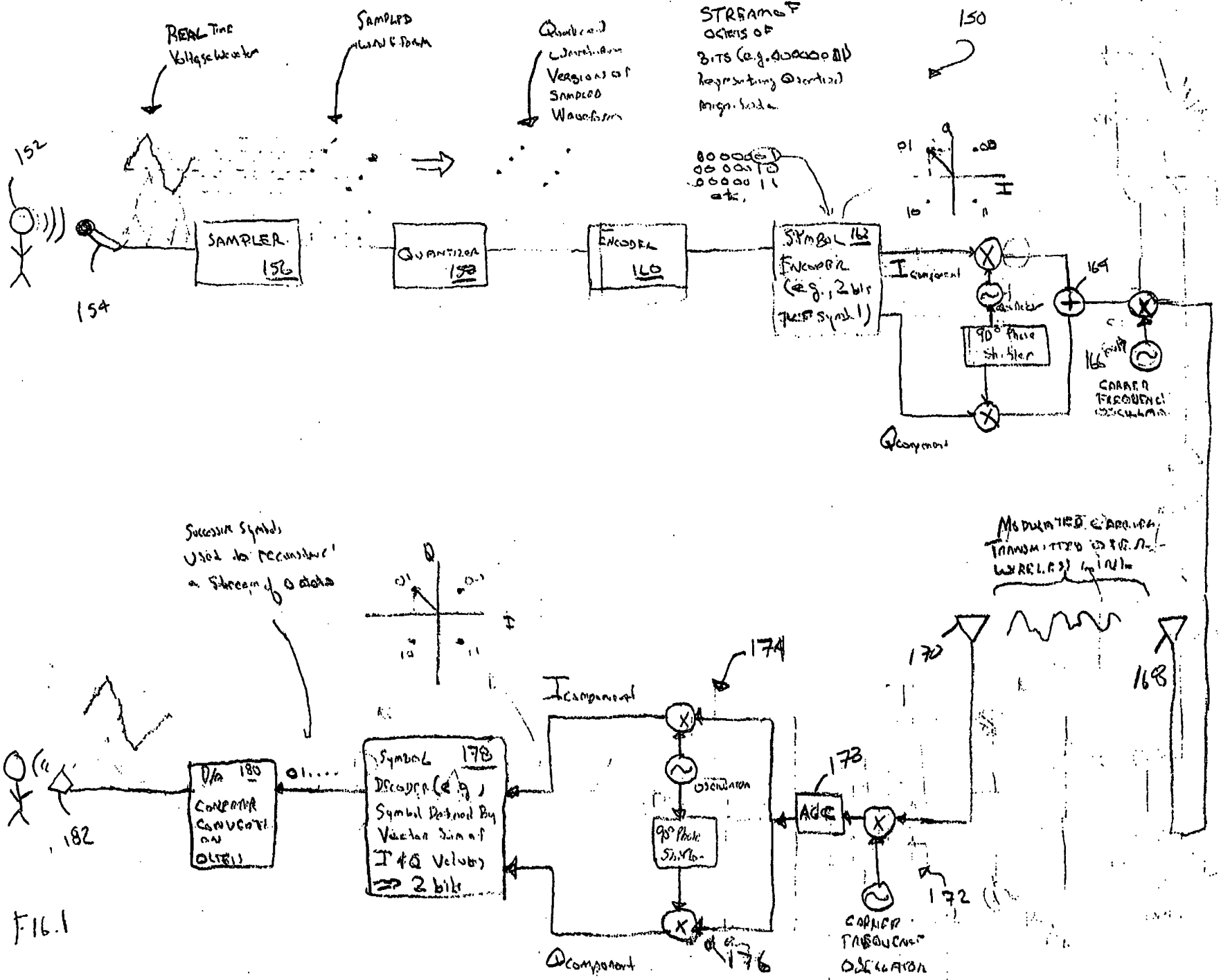
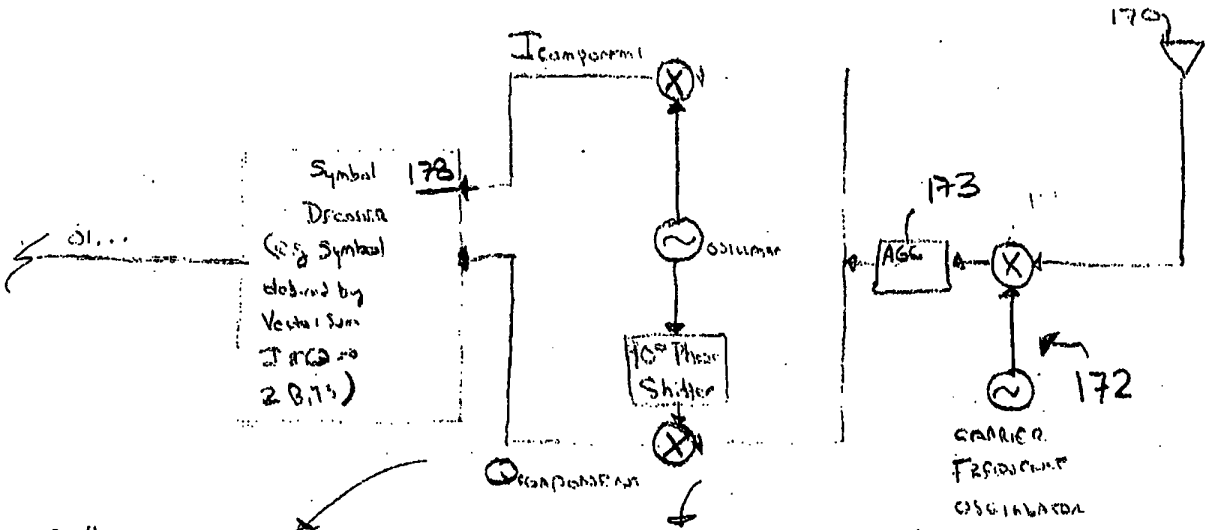
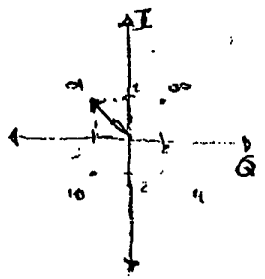

REAL TIME Voltage Waveform
SAMPLED Waveform
Quantized Version of Sampled Waveform
STREAM OF octets OF BITS (e.g. 00000000) representing Quantized magnitudes
150
152
154
SAMPLER 156
QUANTIZER 158
ENCODER 160
SYMBOL 162 ENCODER (e.g., 2 bits per symbol)
I component
Q component
90° Phase Shifter
164
166
CARRIER FREQUENCY OSCILLATOR
Succession Symbols used to reconstruct a Stream of Data
MODULATED CARRIER TRANSMITTED OVER WIRELESS LINK
174
170
168
182
D/A 180 CONVERTER CONVERSION OUTPUT
SYMBOL 178 DECODER (e.g.) Symbol Defined By Vector Sum of I & Q Values ⇒ 2 bits
OSCILLATOR
90° Phase Shifter
AGC 173
172
176
CARRIER FREQUENCY OSCILLATOR

FIG. 1



In "Ideal" system I & Q components are always detected correctly, giving correct symbol



However, in an actual, physical system, system irregularities (e.g. DC offsets) can cause errors on either or both I & Q components (e.g., DC offset on Q could cause error)

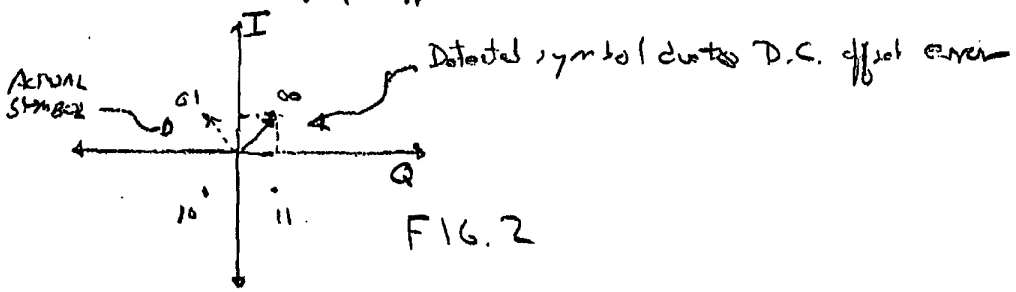


FIG. 2

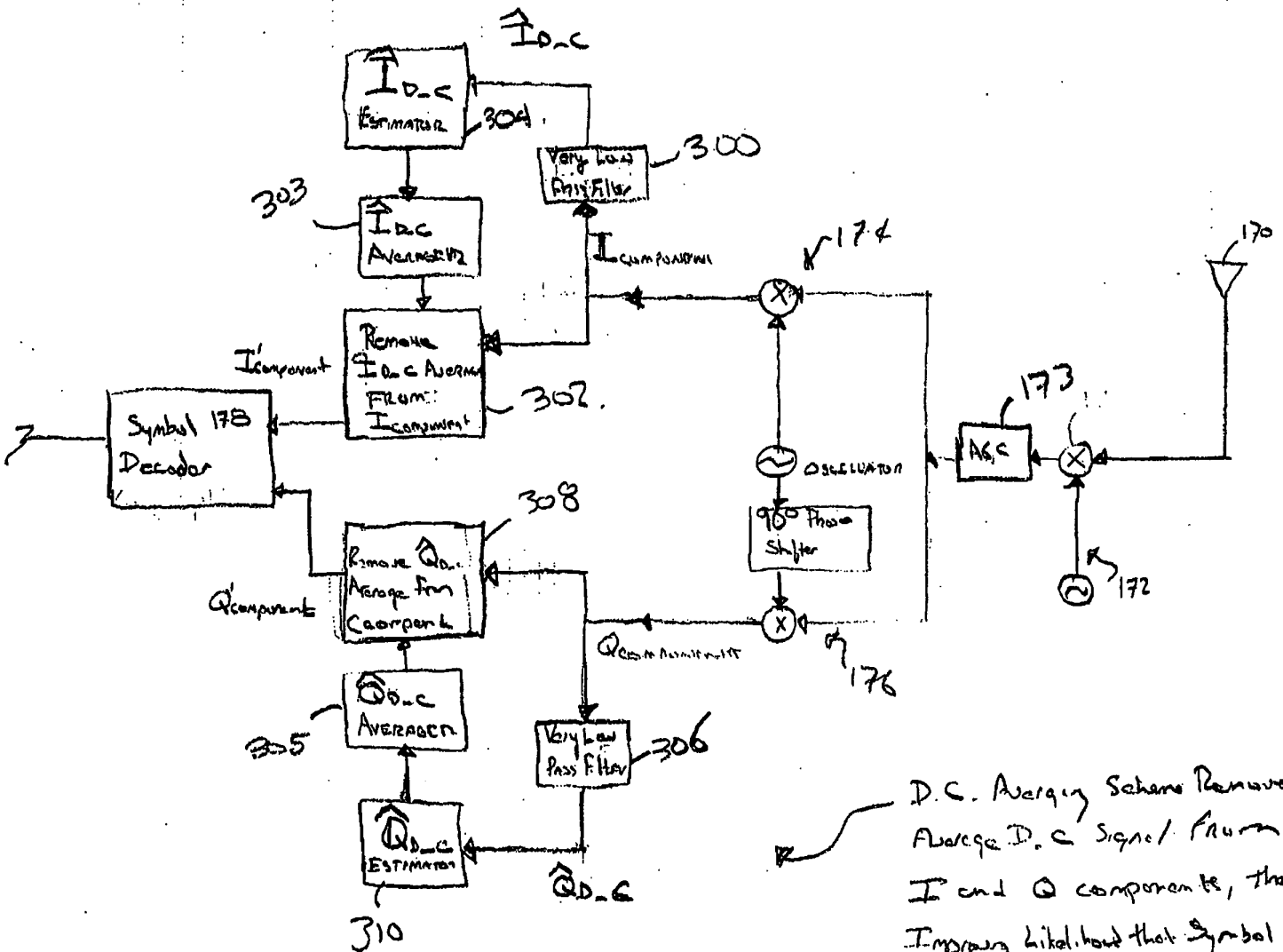

$\hat{I}_{D.C}$
$I_{D.C}$ Estimator
304
Very Low Pass Filter
300
303
$I_{D.C}$ Average
$I_{component}$
174
170
Remove $\hat{I}_{D.C}$ Average From $I_{component}$
302
$I'_{component}$
Symbol 178 Decoder
Oscillator
AGC
173
90° Phase Shifter
172
308
Remove $Q_{D.C}$ Average from $Q_{component}$
$Q'_{component}$
$Q_{component}$
176
$\hat{Q}_{D.C}$ Average
305
Very Low Pass Filter
306
$\hat{Q}_{D.C}$ Estimator
310
$\hat{Q}_{D.C}$
D.C. Averaging Scheme Removes Average D.C Signal From I and Q components, thereby Improving Likelihood that Symbol Correctly Decodes

FIG. 3